

CLAIMS:

We claim:

1. A method of reducing a relative humidity of inside air inside an enclosed space,
the method comprising:

drawing outside air from outside the enclosed space to create an air stream
discharging into the enclosed space;

allowing an amount of air substantially corresponding to the air stream to escape
from the enclosed space;

sensing the relative humidity of the air in at least one sensing location;

in response to the relative humidity sensed at the at least one sensing location,
raising a temperature of the outside air drawn in as required to lower the relative
humidity of the air stream such that the relative humidity of the inside air is
substantially maintained at a desired relative humidity.
2. The method of Claim 1 wherein at least one sensing location is located to sense
the relative humidity of the outside air.

3. The method of Claim 1 wherein at least one sensing location is located to sense the relative humidity of the air stream.
4. The method of Claim 1 wherein at least one sensing location is located to sense the relative humidity of the inside air at a location remote from the air stream.
5. The method of Claim 1 wherein the relative humidity of the inside air is substantially maintained at a desired relative humidity by raising the temperature of the outside air and adjusting a volume of the air stream.
6. The method of Claim 1 further comprising purifying the air stream by filtering the outside air with a HEPA filter capable of High Efficient Particulate Attenuation to substantially remove mold spores.
7. The method of Claim 1 further comprising purifying the air stream by irradiating the air stream with ultra-violet light to kill micro-organisms and spores in the air stream.
8. The method of Claim 1 wherein a temperature of the inside air is controlled by heating or cooling the inside air.

9. The method of Claim 8 wherein the inside air is heated or cooled by circulating the inside air through a temperature adjusting element.
10. An apparatus for reducing a relative humidity of inside air inside an enclosed space, the apparatus comprising:
 - a portable outside air heat exchanger unit comprising:
 - a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;
 - a temperature adjusting element located in the air stream;
 - wherein the intake is adapted to draw air from outside the enclosed space and the outlet is adapted to discharge the air stream into the enclosed space;
 - a heating source connectable to the heat exchanger unit and operative to supply heat energy to the temperature adjusting element in response to directions from a heat controller;

at least one humidity sensor operative to sense the relative humidity of the air in a sensing location and to send a humidity signal to the heat controller;

wherein the heat controller is operative to receive the humidity signal and change the amount of heat energy supplied to the temperature adjusting element in response to the humidity signal.

11. The apparatus of Claim 10 wherein at least one sensing location is located to sense the relative humidity of the outside air.
12. The apparatus of Claim 10 wherein at least one sensing location is located to sense the relative humidity of the air stream.
13. The apparatus of Claim 10 wherein at least one sensing location is located to sense the relative humidity of the inside air at a location remote from the air stream.
14. The apparatus of Claim 10 further comprising a HEPA filter capable of High Efficient Particulate Attenuation located such that the air stream passes through the HEPA filter.

15. The apparatus of Claim 14 further comprising a coarse filter located upstream from the HEPA filter such that the air stream passes through the coarse filter prior to passing through the HEPA filter.
16. The apparatus of Claim 14 further comprising an activated carbon filter located upstream from the HEPA filter such that the air stream passes through the activated carbon filter prior to passing through the HEPA filter
17. The apparatus of Claim 10 further comprising an ultra-violet light oriented to irradiate the air stream.
18. The apparatus of Claim 14 further comprising an ultra-violet light source oriented to irradiate the air stream with ultra-violet light after the air stream has passed through the HEPA filter.
19. The apparatus of Claim 10 further comprising a fan controller operative to change the speed of the fan to vary the volume of air in the air stream in response to the humidity signal.
20. The apparatus of Claim 10 wherein the temperature adjusting element comprises an electric heating element and wherein the heating source is an electrical power outlet connectable to the electric element by a power cord.

21. The apparatus of Claim 11 wherein the temperature adjusting element comprises a fluid coil and wherein the heating source is a fluid heater connectable to the fluid coil by conduits such that heated fluid flows from the fluid heater through the fluid coil and back to the fluid heater.
22. The apparatus of Claim 10 wherein the temperature adjusting element comprises a fluid coil and wherein the heating source is a fluid heater connectable to the fluid coil by conduits such that heated fluid flows from the fluid heater through the fluid coil and back to the fluid heater.
23. The apparatus of Claim 22 further comprising a fluid cooler connectable to the fluid coil by conduits such that cooled fluid flows from the fluid cooler through the fluid coil and back to the fluid cooler in response to directions from a cooling controller.
24. The apparatus of Claim 10 further comprising a portable inside air heat exchanger unit comprising:
 - a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;

an electric heating element located in the air stream;

wherein the intake is adapted to draw air from inside the enclosed space and the outlet is adapted to discharge the air stream into the enclosed space.

25. The apparatus of Claim 24 further comprising a temperature sensor operative to send a temperature signal and a temperature controller operative to receive the temperature signal, and wherein power to the electric heating element in the inside air heat exchanger unit is controlled by the temperature controller in response to the temperature signal.
26. The apparatus of Claim 12 further comprising a portable inside air heat exchanger unit comprising:

a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;

a fluid coil located in the air stream and connectable to the fluid heater by conduits such that heated fluid flows from the fluid heater through the fluid coil and back to the fluid heater;

wherein the intake is adapted to draw air from inside the enclosed space and the outlet is adapted to discharge the air stream into the enclosed space.

27. The apparatus of Claim 26 further comprising a temperature sensor operative to send a temperature signal and a temperature controller operative to receive the temperature signal, and wherein the flow of heated fluid through the fluid coil in the inside air heat exchanger unit is controlled by the temperature controller in response to the temperature signal.
28. The apparatus of Claim 24 wherein the inside air heat exchanger unit further comprises a HEPA filter capable of High Efficient Particulate Attenuation located such that the air stream created by the inside air heat exchanger unit passes through the HEPA filter.
29. The apparatus of Claim 28 further comprising a coarse filter located upstream from the HEPA filter in the inside air heat exchanger unit such that the air stream passes through the coarse filter prior to passing through the HEPA filter.
30. The apparatus of Claim 24 further comprising an ultra-violet light oriented to irradiate the air stream in the inside air heat exchanger unit.

31. An apparatus for drying and scrubbing inside air inside an enclosed space, the apparatus comprising:

a portable heat exchanger unit comprising:

a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;

a temperature adjusting element located in the air stream;

a HEPA filter capable of High Efficient Particulate Attenuation located such that the air stream passes through the HEPA filter;

a coarse filter located upstream from the HEPA filter such that the air stream passes through the coarse filter prior to passing through the HEPA filter;

a heating source connectable to the heat exchanger unit and operative to supply heat energy to the temperature adjusting element in response to directions from a heat controller.

32. The apparatus of Claim 31 further comprising an activated carbon filter located upstream from the HEPA filter such that the air stream passes through the activated carbon filter prior to passing through the HEPA filter.
33. The apparatus of Claim 31 further comprising an ultra-violet light source oriented to irradiate the air stream with ultra-violet light.
34. The apparatus of Claim 31 wherein the temperature adjusting element comprises an electric heating element and wherein the heating source is an electrical power outlet connectable to the electric element by a power cord.
35. The apparatus of Claim 31 wherein the temperature adjusting element comprises a fluid coil and wherein the heating source is a fluid heater connectable to the fluid coil by conduits such that heated fluid flows from the fluid heater through the fluid coil and back to the fluid heater.
36. The apparatus of Claim 35 further comprising a fluid cooler connectable to the fluid coil by conduits such that cooled fluid flows from the fluid cooler through the fluid coil and back to the fluid cooler in response to directions from a cooling controller.

37. The apparatus of Claim 36 wherein the filters and the fluid coil are located upstream from the fan.
38. The apparatus of Claim 37 further comprising an ultra-violet light source oriented to irradiate the air stream with ultra-violet light.
39. The apparatus of Claim 38 further comprising a drip pan oriented to catch condensed water dripping from the fluid coil during a cooling operation, and wherein the ultra-violet light source is oriented to irradiate water collected in the drip pan with ultra-violet light.
40. The apparatus of Claim 31 wherein the intake of the portable heat exchanger unit is adapted so that the portable heat exchanger unit draws outside air from outside the enclosed space, and wherein the outlet of the portable heat exchanger unit is adapted so that the portable heat exchanger unit discharges the air stream into the enclosed space.
41. The apparatus of Claim 40 further comprising at least one humidity sensor operative to sense the relative humidity of the air in a sensing location and to send a humidity signal, and wherein the heat controller is operative to receive the humidity signal and change the amount of heat energy supplied to the temperature adjusting element in response to the humidity signal.

42. The apparatus of Claim 41 further comprising a fan controller operative change the speed of the fan to vary the volume of air in the air stream.
43. The apparatus of Claim 31 wherein the intake of the portable heat exchanger unit is adapted so that the portable heat exchanger unit draws inside air from inside the enclosed space, and wherein the outlet of the portable heat exchanger unit is adapted so that the portable heat exchanger unit discharges the air stream into the enclosed space.
44. The apparatus of Claim 43 further comprising at least one temperature sensor operative to sense the temperature of the air inside the enclosed space and to send a temperature signal, and wherein the heat controller is operative to receive the temperature signal and change the amount of heat energy supplied to the temperature adjusting element in response to the temperature signal.